



11th Annual Hardware and Software Experiments to Teach Undergraduate Neuroscience - Curriculum Development Workshop (10-14 July 2017)

LODGING AND MEALS for participants to be paid from a National Science Foundation grant during 2017

The University of Missouri-Columbia Colleges of Engineering and Biological Sciences will host a 5-day interdisciplinary workshop focused on active learning in neuroscience using virtual (software) labs from Monday- Friday, July 10-14, 2017 on the Columbia campus. This workshop is targeted to undergraduate faculty from biological sciences, psychological sciences and engineering and to high school teachers with an interest in teaching and learning more about neuroscience using software-based instructional modules. The workshop was initiated in 2007 as part of a National Science Foundation grant to MU to develop undergraduate curriculum in the area of computational neuroscience, and continues to be offered free beyond the duration of the grant.

In recent years, Computational Neuroscience has developed tools to abstract and generalize principles of neural function using mathematics. These tools have proven powerful for research in a wide neuroscience spectrum including molecular, cellular, and systems levels. However, computational methods also provide valuable tools for teaching neuroscience. Several comprehensive, yet easy to use software packages to model neurons and networks, which can be used in teaching, are available at low costs. Neural models can be used alone, or together with simple biological experiments to demonstrate basic neurobiological concepts, and give students hands-on experience, to significantly improve the student's learning experience.

The workshop will introduce one hardware and seven software experiments in the form of 'virtual labs' which can be directly incorporated into existing neurobiology or physiology courses, or used for the development of new courses. The hardware experiment covered in the workshop can be custom build locally at low cost (all instructions to build it will be provided). Workshop participants are supplied with 'ready to use' electronic versions of all hardware and software experiments, and of all the lectures.

Prior to arrival on campus - A primer we developed 'Basics of Neurobiology' will be sent to participants a month prior to Workshop. Participants are also provided access to the Blackboard site with all materials.	
Saturday evening prior to Workshop (6-9 pm) Review of Neurobiology and electrophysiology	
Morning (8 am - 12 pm)	Afternoon (1 pm - 5 pm)
<u>Monday.</u> Basic Math: derivatives and integration Biology: Resting potential and GHK-equation Voltage-gated channels and AP	Hardware Expt. 1 – Recordings of earthworm sensory and muscle potentials; <u>Math in Bio</u> Software Expts. 1 & 2 – Rest and AP
<u>Tuesday.</u> Bursting; Synaptic transmission; <u>Attendees Teach</u>	Software Expt. 3 – Bursting; <u>Attendees Teach</u>
<u>Wednesday.</u> Soft. Expt. 4: Spiking using synapses; <u>Teach</u>	Soft. Expt. 5: Central pattern generator; <u>Teach</u>
<u>Thursday.</u> Soft. Expt. 6: Modeling earthworm escape reflex using synapses and neurons; <u>Attendees Teach</u>	Soft. Expt. 7: Modeling networks - short term memory, half-center oscillator, etc; <u>Teach</u>
<u>Friday.</u> Attendees Teach; Ideas for software experiments	Ends at 12:00 noon on Friday

What will you get? Modules of 'software' experiments and one hardware experiment for use in a variety of courses in areas such as: physiology, psychology, engineering,and even at the high school level; plans for building low cost neurobiology equipment for teaching and research; introduction to using software for experiments, 'quantitative thinking' in neuroscience; familiarization with the software package NEURON which is a powerful tool for teaching and research; contacts and comradeship with like-minded scientists and educators in the region; participation in a neuroscience support-network.

Location and accommodation: The workshop will host 15 faculty, and will be conducted on the University of Missouri-Columbia campus. Accommodation is available in University dorms which has single and double occupancy rooms. Or you can stay outside campus at your own cost.

Cost: During 2017, an NSF grant will cover expenses associated with accommodation at University dorms, and meals at the dorms. If you decide to stay off campus, we can only reimburse at the dorm rate/day. Travel costs should be borne by the attendees – we may cover partial costs of travel depending on the availability of funds.

Eligibility & Application process: Faculty at 2-year and 4-year colleges and universities, and high school teachers with interest in teaching neurobiology are eligible to apply. To apply, just complete the on-line application form at the site - <http://engineering.missouri.edu/neuro/outreach/neuroscience-workshop/>

For further information about the workshop, contact Drs. Satish S. Nair (573-882-2964; nairs@missouri.edu), David J. Schulz (573-882-4067; schulzd@missouri.edu), or David Bergin (573-882-1303; bergind@missouri.edu)

Application Deadline: March 30, 2017 (see following page for additional information about the NSF project).

TEACHING UNDERGRADUATE NEUROSCIENCE – HOW MIGHT WE IMPROVE IT?

Greetings!

A team at University of Missouri has received funding for 2015-16 (extended to 2017) from the National Science Foundation for a project titled “Interdisciplinary Training in Neuroscience for Faculty and Undergraduates from 2- and 4-year Institutions”.

PI: Dr. Satish Nair, Co-PIs: Dr. David Schulz, Biology; and Dr. David Bergin, Evaluator. The project has been extended for one more year, and so participants in 2017 will receive partial funding for attending the workshops.

What is the project about? The goal of this IUSE project is to build on past successes to both enhance teaching expertise of faculty, and increase undergraduate capacity in neuroscience at 2- and 4-year institutions. This goal will be achieved by meeting the following objectives: (i) Provide training in teaching undergraduate neuroscience, emphasizing computation via free *software* experiments to faculty-student teams via 1 week summer workshops; (ii) We can also provide focused training in developing your own tailored software experiment using NEURON; (iii) Provide year-round follow up for all participants to help them develop and implement software modules into their curriculum; and (iv) Identify barriers to learning (students), and to professional development and implementation of curricular modules (faculty and administrators) that limit increasing undergraduate capacity in neuroscience, by surveys and focus group meetings.

HOW CAN YOU BENEFIT?

1. By attending at the fully paid 5-day *Workshop* from 10-14 July 2017 (see previous page for details). We will be recruiting a total of 15 faculty for this 5-day workshop. Partial expenses for travel, and lodging + meals at University dorms will be paid by NSF. PI. note that we cannot pay for expenses if you decide to stay off-campus; we can only reimburse at the dorm rate/day to cover such lodging. You are encouraged to bring (optional) another faculty member or from physics/math/computer science with interest in neuroscience.

SELECTION OF PARTICIPANTS (15 seats available)

The PIs will select the top 15 faculty applicants based on the quality of the application packet, statement of interest, underrepresented status of applicants, and vitae. Applications will be accepted only via the on-line website - <http://engineering.missouri.edu/neuro/outreach/neuroscience-workshop/>

Statement of interest: Interest and plans to implement computation and active learning neuroscience modules into existing or new course(s) is required. Past attendees are welcome. Before you apply via the on-line site, you will need a 1-page statement of interest– indicate course(s) you teach or plan to teach, and how the workshop may possibly enhance it, and have your curriculum vitae ready. Faculty can optionally bring another faculty or student from physics/math/computer science/... with interest in neuroscience – their lodging and meal expenses will also be covered.

Optional other attendee (faculty colleague from Physics/Math/Computer Science): Include resume, and a 1-page statement expressing interest in neuroscience and how you may collaborate in teaching and/or research.